



Comprehensive Long-Term Environmental Action Navy (CLEAN)  
Contract No N62742 94-D-0048  
Contract Task Order No 0030

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Camp Covington

**Draft Sampling and Analysis Plan**  
**Abbreviated**  
**Remedial Investigation**  
**New Apra Heights Disposal Area**  
**COMNAVMARIANAS, Guam**

Prepared for



Department of the Navy  
Commander Pacific Division  
Naval Facilities Engineering Command  
Pearl Harbor Hawaii 96860 7300

Prepared by



Earth Tech, Inc  
700 Bishop Street, Suite 900  
Honolulu, Hawaii 96813

April 1998

## EXECUTIVE SUMMARY

This document serves as the Sampling and Analysis Plan (SAP) for the Abbreviated Remedial Action (RI) of the New Apra Heights Disposal Area Site. The New Apra Heights Disposal Area is located approximately 2 miles inland of Agat Bay. For this investigation, the disposal area has been separated into two portions. The northern portion lies on the Building 4175 parcel adjacent to and northeast of the disposal area. The investigation of this portion of the disposal area will be conducted by the Navy at a later date. The southern portion, which lies on the New Apra Heights parcel, will be investigated during the RI.

The SAP consists of the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP). The FSP outlines the activities required to obtain data used in characterizing the New Apra Heights Disposal Area. Included in the FSP are the objectives, sampling procedures, equipment, types of samples to be collected, locations and frequencies of samples, and analyses of interest. The QAPP specifies sample custody procedures, calibration procedures for field and laboratory instruments, quality assurance audit procedures, and data documentation and tracking procedures.

This SAP has been prepared in accordance with the following guidance documents: *Guidance for Performing Site Inspections under CERCLA* (EPA/540 R 92 021) and *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (EPA 5406 89 004).

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## ACRONYMS AND ABBREVIATIONS

ARAR	Applicable and Appropriate Requirement
ASTM	American Society for Testing Materials
CLEAN	Comprehensive Long Term Environmental Action Navy
CLP	contract laboratory program
COMNAVMARIANAS	Commander U S Naval Forces Marianas
CTO	Contract Task Order
DON	Department of the Navy
DOT	U S Department of Transportation
Earth Tech	Earth Tech, Inc
FSP	field sampling plan
GP	government property
IDW	investigation derived waste
ILM	Inorganic Laboratory Method
IRP	Installation Restoration Program
NAVACTS	Naval Activities
OLM	Organic Laboratory Method
PACNAVFACENGCOM	Pacific Division Naval Facilities Engineering Command
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PE	performance evaluation
PID	photoionization detector
PPE	personal protective equipment
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act of 1976
RI	Remedial Investigation
SAP	Sampling and Analysis Plan
SVOC	semi volatile organic compounds
SHS	Southern High School
SOP	standard operating procedure
SW	Statement of Work
TBC	to-be-considered
TAL	target analyte list
TPH	total petroleum hydrocarbon
VOC	volatile organic compound
WP	Work Plan

## **1 INTRODUCTION**

This Field Sampling Plan (FSP) is the first part of the Sampling and Analysis Plan (SAP) for the Abbreviated Remedial Investigation (RI) at the New Apra Heights Disposal Area. The RI will characterize the nature and extent of environmental contamination resulting from past disposal and burial practices. For site history, site settings, initial evaluation, and the data quality objectives, see the RI Work Plan (WP) (Earth Tech 1998).

### **1.1 BACKGROUND**

The New Apra Heights Disposal Area is located in the west central portion of the Island of Guam, approximately 2 miles inland of Agat Bay (see Figure 1.1). The southwestern portion of the disposal area is on the New Apra Heights parcel, while the northeastern portion is on the adjacent Building 4175 parcel. Both parcels are owned and operated by the Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS), Guam (formerly Naval Activities [NAVACTS]). Only the portion of the disposal area located on the New Apra Heights parcel will be investigated during this RI. This parcel will be referred to as the "Site."

The property, now leased by the Government of Guam from the U.S. Government, historically was used by the Navy's 129th Construction Battalion as a motor pool and storage yard, and by the Army's 53rd Regiment as a base. An Army Field Hospital may also have been located on this property. The Site is surrounded by the New Apra Heights Housing Community to the northwest, the Building 4175 parcel (now an elementary school) to the northeast, the Southern High School to the southeast, and the Santa Rita housing community to the southwest (see Figure 1.1).

The discovery of stained soil and buried scrap metal during construction of the SHS led to an SI of that property in 1995 to assess the nature and extent of contamination. Soil gas, surface soil, and subsurface soil samples were collected throughout the SHS site and from offsite locations where excavated site soil had been deposited. Elevated levels of total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), target analyte list (TAL) metals, and explosive residues were detected at the SHS site (Ogden 1995). Observation made during the SI and construction phase at the SHS site, and results from a geophysical survey conducted in September 1997, indicate that metal debris extends onto the Site and the Building 4175 parcel (Earth Tech 1997).

Based on previous conclusions, data, analyses, and information, this RI will include passive soil gas sampling, surface soil sampling, and subsurface (trench) sampling to delineate the extent of possible contamination from the metal debris. For further information, see the WP (Earth Tech 1998).

### **1.2 IDENTIFICATION OF DATA NEEDS**

This RI will characterize environmental conditions and define the nature and extent of contamination by analyzing geological, geophysical, chemical, physical, and soil gas data.

### **1.3 SAMPLING OBJECTIVES**

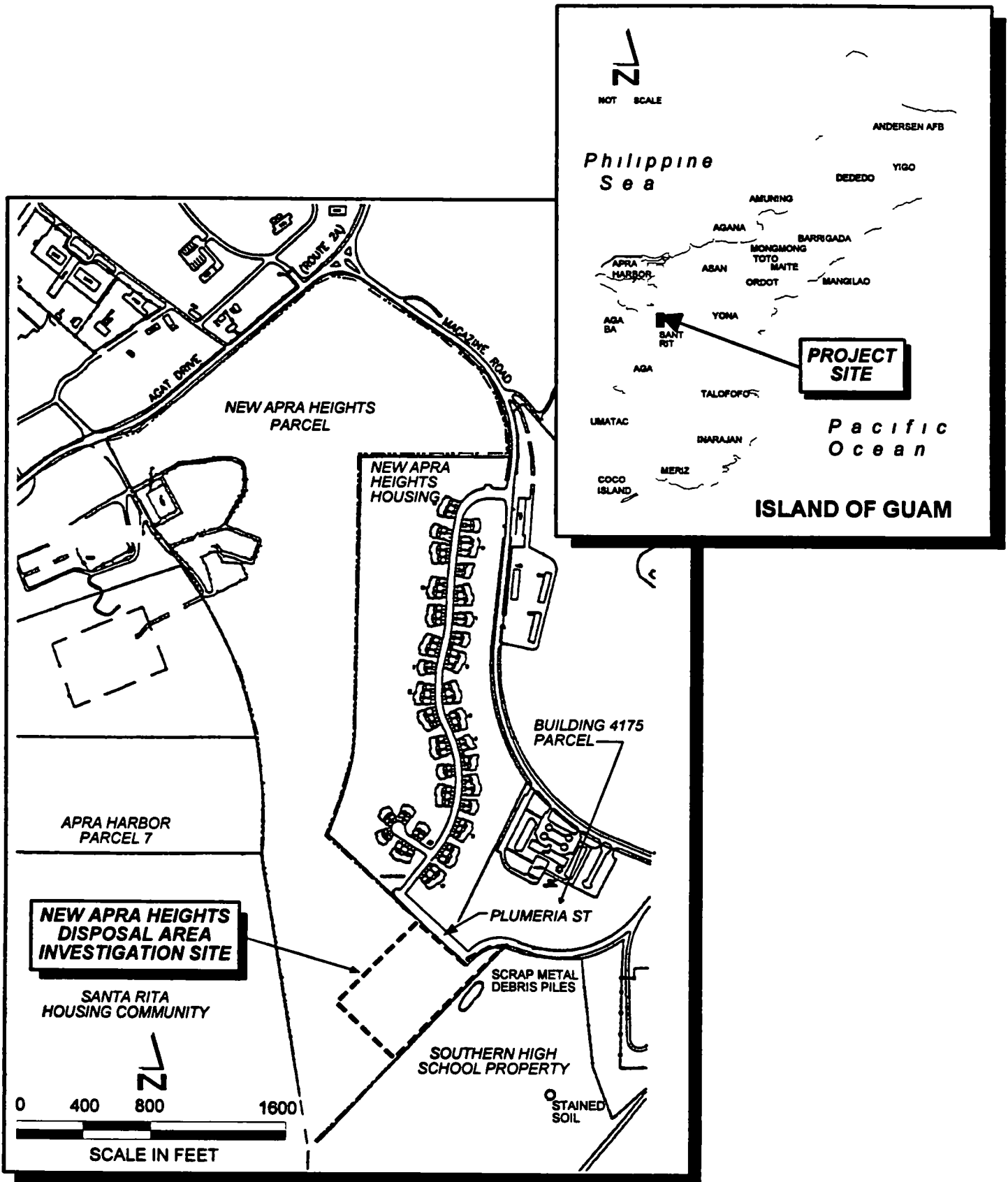
The RI has three objectives:

- Determine if the Site contains detectable levels of contamination.
- Characterize the nature and extent of contamination resulting from past disposal and burial practices, and



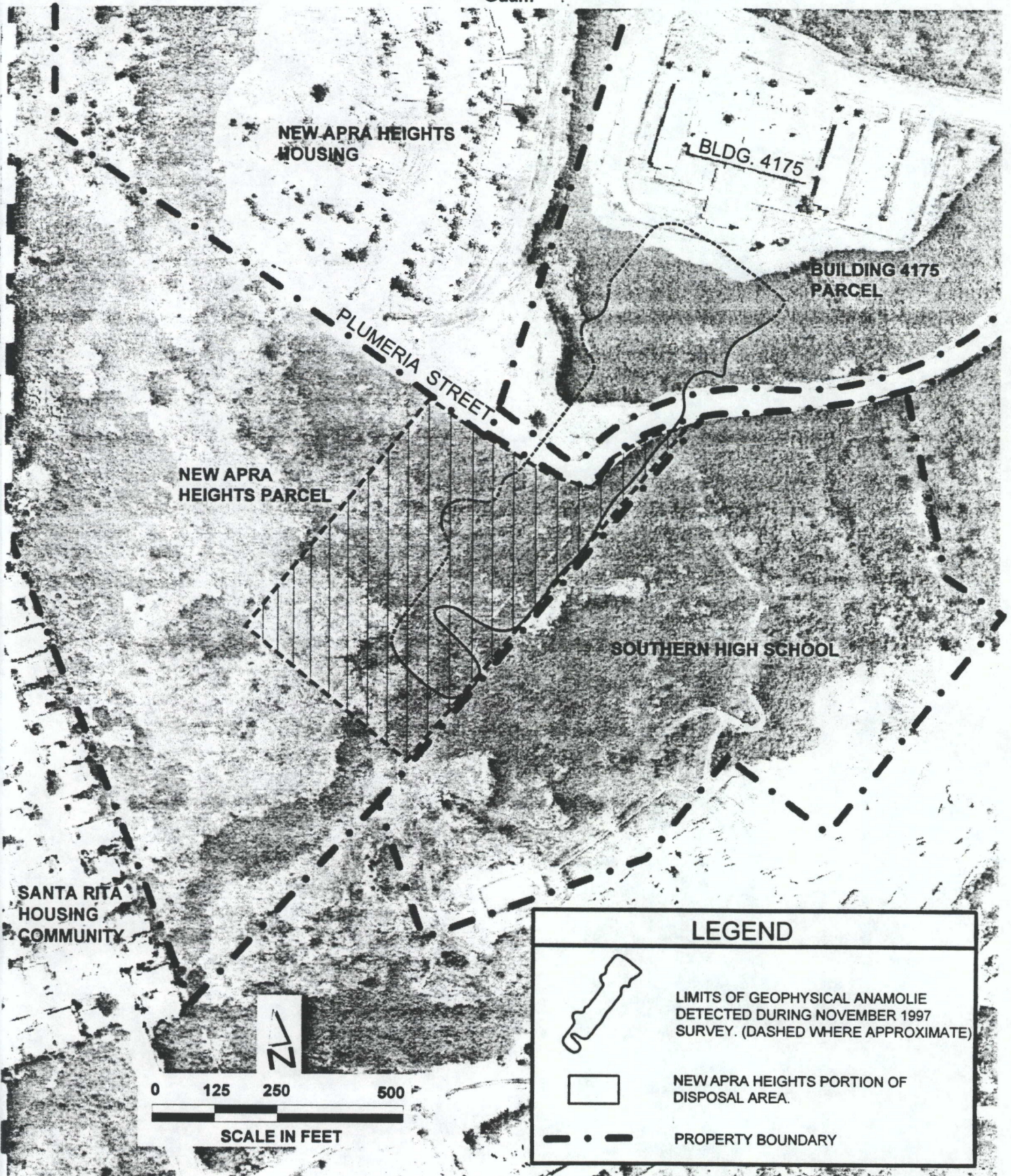
Determine the potential risk contamination posed human health and the ecology, both onsite and offsite.

**Figure 1 1 Site Location Map**  
**New Apra Heights Disposal Area**  
**Guam**





**Figure 1-2: Site Plan and Property Boundaries**  
**New Apra Heights Disposal Area**  
**Guam**





## 2. DESCRIPTION OF FIELD SAMPLING PROGRAM

The field sampling program will entail the following activities. The standard operating procedures (SOPs) applicable to the RI appear in *Project Procedures Manual, U.S. Navy PACNAVFACENG-COM Installation Restoration Program (IRP)* (DON 1996).

### 2.1 VEGETATION CLEARING

Personnel with excavation equipment will clear paths through the vegetation to access sampling locations. The vegetation clearing and sampling activities will take into account the results of the wetland survey performed in November 1997 (Earth Tech 1998) under CTO 0030. Only the minimum amount of vegetation necessary to gain access to the sampling locations will be cleared and disposed of in the Navy PWC Landfill.

### 2.2 UTILITY SURVEY

During this investigation, the grid will be expanded to the northwest to survey the Site boundary as shown in Figure 2-1. All proposed sampling points will be cleared of utility lines prior to any intrusive activities in accordance with SOP I-A-6, *Utility Clearance*. Utility maps will be reviewed to locate physical features and record the results of the utility survey.

### 2.3 PASSIVE SOIL GAS SURVEY

#### 2.3.1 Location

The field team will install soil gas probes to guide selection of soil sampling locations (surface and subsurface). Fifty-foot spacing on a triangular grid will provide maximum site coverage and a 95-percent confidence level for locating hot spots (see Figure 2-2). Details on the grid spacing appear in Section 4 of the WP (Earth Tech 1998). Additional samples will be taken in the wedge-shaped area at the northeast corner of the Site.

#### 2.3.2 Procedure

Soil gas probes will be installed and operated according to the manufacturer's recommendations. The soil gas survey will be conducted in accordance with SOP I-B-3, *Soil Gas Survey*. The supplier of the soil gas probes will assist with the documentation needed for shipping the probes off-island and, consequently, for inspection by the United States Department of Agriculture (USDA). Approximately 134 soil gas samples and duplicates will be collected. Soil gas probes will remain in the ground for approximately 2 weeks. They will then be removed from the ground and analyzed by the supplier for VOCs and SVOCs. The results of the passive soil gas survey will be used to adjust the soil sampling locations.

### 2.4 FIELD SCREENING

Field screening of selected samples will be performed during collection of subsurface samples to estimate volatile contamination. The field screening process will help determine which subsurface soil samples will be analyzed. A field quality photoionization detector (PID) will be used to screen samples for volatile contamination.

After the sample has been extracted, a small amount of soil will be transferred to a sealable plastic bag and stored for VOC analysis. The amount of soil and equilibration time for each headspace sample analysis should be kept constant by field personnel. The soil samples will be allowed to

come to equilibrium with the gas phase in the plastic bag until the vapor concentration of the hydrocarbons is fairly constant. After a set period of time for equilibration (approximately 15–20 minutes), the bag will be opened slightly and the PID probe will be inserted quickly into the bag. Readings will be recorded according to SOP III-D, *Logbooks*, and used to determine which sample will be shipped for chemical analysis.

Results of field screenings will be used to improve sampling designs. Reliability of field screenings are continually evaluated during the field work. When the evaluation demonstrates that the field screenings accurately predict the relative level of contamination present, more extensive reliance may be placed on the results. The increased reliance involves analyzing only a certain percentage of the total number of samples to be taken instead of having each sample analyzed. Areas where high concentrations of contaminants (>1000 parts per million) are detected can be more thoroughly investigated.

## **2.5 SURFACE SOIL SAMPLING**

### **2.5.1 Location**

The field crew will collect 26 routine surface soil samples. Twenty-one of the samples will be collected in predetermined locations along a triangular grid with a spacing of 100 feet between nodes (see Figure 2-3). These sampling locations will be adjusted based on the passive soil gas survey results prior to sampling. Five additional surface soil samples will be collected from low-lying areas suspected to receive runoff from the Site. Data from these samples will be used to assess the potential for migration of contaminants from the Site. Analytical results will be used to assess exposure pathways via direct contact and surface water migration. A fixed-base laboratory will analyze these samples for TPH (gasoline, diesel, and lubricating cooler), VOCs, SVOCs, chlorinated pesticides and PCBs, explosives, and TAL metals as indicated in Section 3. For more details on sampling size, area, and location derivation, consult the WP (Earth Tech 1998).

### **2.5.2 Procedure**

All surface soil samples will be accurately located on field maps. Detailed soil classification will be recorded on the surface soil sampling log in accordance with SOP I-E, *Soil and Rock Classification*. Surface soil samples will be collected using a stainless steel core barrel with inner sleeves, or using the inner sleeves alone by driving them into the soil after some of the vegetative matter has been scraped. For core barrels, pre-cleaned sample liners will be loaded into the core barrel prior to sampling and driven to the appropriate depth for sample collection. The liners will be removed from the core barrel, and the ends covered with Teflon and sealed with plastic end caps. The liners will be used as sample containers. Samples will be labeled according to SOP III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*, and placed in a cooler. The core barrels and liners will be decontaminated before each use in accordance with SOP I-F, *Equipment Decontamination* and Section 2.7 of this FSP.

## **2.6 SUBSURFACE SOIL SAMPLING**

### **2.6.1 Location**

Twenty-one trenches will be excavated to collect subsurface soil samples and to permit visual investigation of subsurface site conditions. Trenches will be dug to 10 feet below ground surface (bgs) at the same locations proposed for the 21 surface soil samples along the triangular grid (see Figure 2-3). Samples will be collected at depths between 5 and 10 feet bgs.

Field personnel will collect two samples from each trench. Based upon the information presented in the Field Screening section above, one sample from each trench will be selected and sent to a fixed-based laboratory for chemical analysis. The laboratory will analyze the trench soil samples for the same parameters as for surface soil samples. Details on sampling size, area, and location derivation are located in the WP (Earth Tech 1998).

### 2.6.2 Procedure

Depending upon soil and surface conditions, a rubber tire backhoe or track-mounted excavator will be used to excavate the trenches. The trenches will be 10–15 feet long. Samples will be obtained from the trench sidewalls. For safety, **no personnel are to enter a trench to obtain samples**; samples will be obtained directly from the bucket of the backhoe. All samples will be properly sealed, assigned an EPA number, and put in a cooler. Sample locations and descriptions will be described and recorded on a field trench log.

Following trench excavation, materials will be observed for lithologic and contaminant characteristics. The exposed trench walls will be mapped in detail. Field observations will be noted in the field notebook and described in detail in the trench log. Lithologic descriptions will include all soil classification information as listed in SOP I-E, *Soil and Rock Classification*. A cross-section of the trench will be included in the field trench log.

During backfill of the trenches, materials that are excavated from depth will be placed back first. Lithologic materials should be replaced in 2–4-foot lifts and recompact. The backfilled trench will be recapped with the original soil surface. If material cannot be replaced, it must be placed in U.S. Department of Transportation (DOT) Type 1A2 drums with removable heads and treated as investigation-derived waste (IDW) in accordance with SOP I-A-7, *IDW Management*.

## 2.7 EQUIPMENT DECONTAMINATION

All nonconsumable equipment that comes into contact with potentially contaminated soil or sediment will be decontaminated using proper procedures. All consumable equipment and solid wastes (soil cuttings) will be discarded and treated as potential hazardous waste. Equipment will be decontaminated by steam cleaning or by a nonphosphate detergent scrub followed by fresh water and distilled or deionized water rinses. Decontamination will take place on pallets or on plastic sheeting. Clean equipment will be stored on plastic sheeting in an uncontaminated area. Equipment stored for an extended period will also be covered by plastic sheeting. All equipment decontamination will be done in accordance with SOP I-F, *Equipment Decontamination*.

## 2.8 GOVERNMENT PROPERTY








Government property (GP) used during the field investigations will be signed out in accordance with the requirements of the CLEAN GP control system. All new equipment purchased, if necessary, will be logged in the GP system. At the end of the field activities, field personnel will inventory consumable and nonconsumable GP. All equipment will be cleaned, organized, and returned to GP inventory.

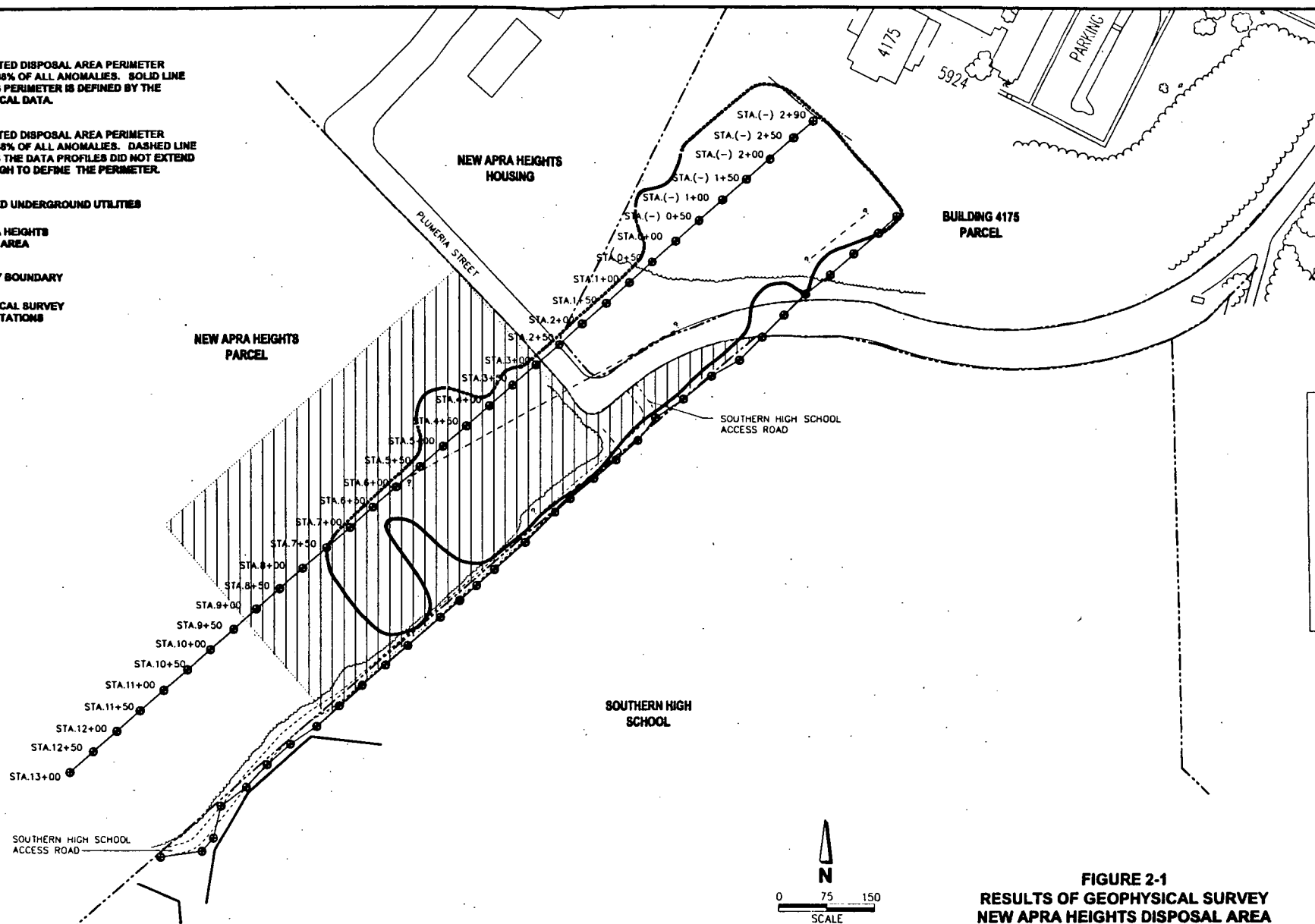
## 2.9 SITE-SPECIFIC FIELD QA/QC REQUIREMENTS

The CLEAN technical director is anticipated to visit the Site during field activities to take note of nonconforming practices. The CTO manager will respond in writing to the audit findings. Performance evaluation (PE) samples of soil will be analyzed in accordance with the SOP III-G,

*Performance Evaluation Procedures.* The PE soil samples will be prepared by a vendor and sent to the Site. These samples will be analyzed for the same parameters, except the explosives analysis, as the surface and subsurface soil samples. Details concerning QA/QC requirements are detailed in the QAPP.

# **LEGEND**

-  INTERPRETED DISPOSAL AREA PERIMETER CLOSING 88% OF ALL ANOMALIES. SOLID LINE INDICATES PERIMETER IS DEFINED BY THE GEOPHYSICAL DATA.
-  INTERPRETED DISPOSAL AREA PERIMETER CLOSING 88% OF ALL ANOMALIES. DASHED LINE INDICATES THE DATA PROFILES DID NOT EXTEND FAR ENOUGH TO DEFINE THE PERIMETER.
-  SUSPECTED UNDERGROUND UTILITIES
-  NEW APRA HEIGHTS DISPOSAL AREA
-  PROPERTY BOUNDARY
-  STA 0+00
-  GEOPHYSICAL SURVEY PROFILE STATIONS

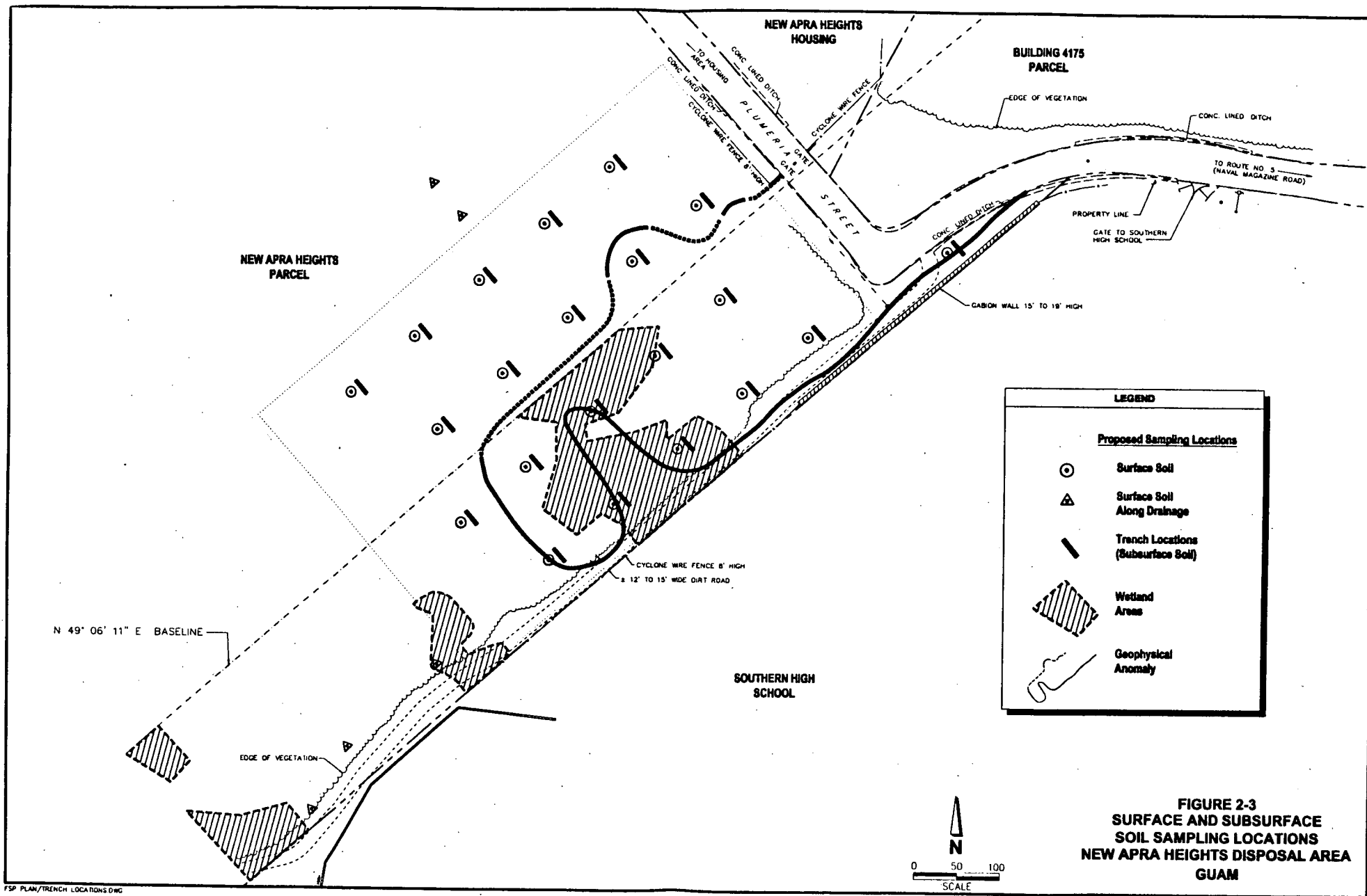


Source: Earth Tech 1997.

**FIGURE 2-1**  
**RESULTS OF GEOPHYSICAL SURVEY**  
**NEW APRA HEIGHTS DISPOSAL AREA**  
**GUAM**







### 3. ANALYTICAL TESTING PROGRAM

#### 3.1 DESCRIPTION OF ANALYTICAL TESTING PROGRAM

Samples collected during this RI are to be analyzed for TPH, VOCs, SVOCs, chlorinated pesticides and PCBs, explosives, and TAL metals. All methods for the analysis of these materials are in conjunction with the requirements established by the USEPA Contract Laboratory Program (CLP) Statements of Work for Organics and Inorganics Analysis (1995a, b) as well as *Test Methods for Solid Waste (SW-846)* (USEPA 1997). Details on the analytical program are located in the QAPP. The parameters to be defined and their associated analytical methods are listed in Table 3-1.

**Table 3-1: Analytical Methods, New Apra Heights Disposal Area, Guam**

Parameter	Analytical Method	Method Number
Volatile Organic Compounds (VOCs)	CLP GC/MS	OLM 3.1
Semi-Volatile Organic Compounds (SVOCs)	CLP GC/MS	OLM 3.1
Chlorinated Pesticides/PCBs	CLP GC-ECD	OLM 3.1
Total Petroleum Hydrocarbons (TPHs)	GC/FID	EPA Method 8015B
Polynuclear Aromatic Hydrocarbons (PAHs)	GC-HPLC	CLP OLM 3.1
Explosives	SW 846	EPA Method 8330
TAL Metals	CLP	ILM 4.0

GC/MS = gas chromatography/mass spectroscopy

ECD = electron capture detectors

FID = flame ionization detectors

HPLC = high performance liquid chromatographs

Ten surface and subsurface soil samples will be analyzed for moisture content, density, particle size distribution, porosity, and permeability in accordance with the American Society for Testing Materials (ASTM) methods. Three-inch-long Shelby Tubes will be used as the containers for these samples. ASTM methods for the geotechnical analysis are summarized in Table 3-2:

**Table 3-2: ASTM Method Summary, New Apra Heights Disposal Area, Guam**

Parameter	Analytical Method	Number of Samples
Moisture Content and Density	ASTM D1557	10
Particle Size Distribution	ASTM D422	10
Porosity	ASTM D854	10
Permeability	EPA 9100	10

#### 3.2 SITE-SPECIFIC LABORATORY QA/QC REQUIREMENTS

Laboratory quality control (QC) activities will be conducted in accordance with SOP III-A, *Laboratory QC Samples*. The purpose of the QC program is to confirm the accuracy of analytical

methods and instrumentation used in testing suspected hazardous materials, and to check potential contamination during sample preparation and analysis. The minimum requirements for QC analyses are blanks, duplicates, surrogates, blank spikes, lab control samples, control samples, matrix spikes, and matrix spike duplicate samples. Field and laboratory QC procedures are detailed in the QAPP section of this SAP. Table 3-3 summarizes the number and type of QC samples to be taken at the Site.

Table 3-3 Sampling and Analysis Plan Summary, New Apra Heights Disposal Area

Analysis	Method	Number of Samples					Total
		Field Samples	Field Replicates	Field Blanks	Equipment Rinsate	Trip Blanks	
Passive Soil Gas Sampling and Analysis							
Volatile Organic Compounds (VOCs)	SW 846 8021	120	12	1	—	1	134
Semi-volatile Organic Compounds (SVOCs)	SW 846 8270B	120	12	1	—	—	133
Surface Soil Sampling and Analysis							
Total Petroleum Hydrocarbons (TPH)	SW-846 8015B	26	3	1	2	3	35
VOCs	CLP OLM03.1	26	3	1	2	3	35
SVOCs	CLP OLM03.1	26	3	1	2	NR	32
Pesticides/PCBs	CLP OLM03.1	26	3	1	2	NR	32
TAL Metals	CLP ILM 4.0	26	3	1	2	NR	32
Explosives	SW-846 8330	26	3	1	2	NR	32
Subsurface Soil Sampling and Analysis							
Total Petroleum Hydrocarbons (TPH)	SW-846 8015B	21	3	1	4	7	36
VOCs	CLP OLM03.1	21	3	1	4	7	36
SVOCs	CLP OLM03.1	21	3	1	4	NR	29
Pesticides/PCBs	CLP OLM03.1	21	3	1	4	NR	29
TAL Metals	CLP ILM 4.0	21	3	1	4	NR	29
Explosives	SW-846 8330	21	3	1	4	NR	29

— = not applicable

NR = not required

#### 4. SAMPLE DESIGNATION

All samples will be labeled with an EPA number and a contractor-specified number in accordance with Navy SOP III-E, *Sample Naming*.

##### 4.1 EPA NUMBER

An EPA number will be assigned to each sample (to facilitate data tracking and storage) as follows:

**xyzzz,**

Where,

- x** CTO managing office (letter indicating office location)
- y** Project or site (letter)
- zzz** Chronological number, starting with 001

For example, the EPA number for the 30<sup>th</sup> sample from a disposal site (site B), where Oahu is the managing office would be AB030. QC samples will be included in the chronological sequence. If a sample is lost during shipping, a replacement sample will be assigned a new EPA number. If different containers for the same sample are shipped on different days, a new EPA number must be assigned. When the letter "Z," the 26<sup>th</sup> site, is reached, lettering will begin at "A" again after consulting with the technical director/QA program manager.

##### 4.2 CONTRACTOR-SPECIFIC SAMPLE IDENTIFICATION NUMBER

An additional sample identifier will be used to provide sample-specific information (e.g., location, sequence, matrix, depth). This identifier will be formatted as shown below:

**NA-bbcc-dee-Dff.f**

Where,

- NA** Designating the New Apra Heights Disposal Area
- bb** Sample type and matrix (see Table 4-1)
- cc** Location number (e.g., 01, 02, 03)
- d** Field QC type (see Table 4-2)
- ee** Chronological sample number from a particular sampling location (e.g., 01, 02, 03, etc.)
- D** The letter "D" denoting depth
- ff.f** Depth of sample in feet bgs. For field blanks and equipment rinsates, the depth field will contain the month and date of collection.

For example, the second sample collected from the fourth trench in the disposal area at a depth of 5 feet will be designated NA-TR04-S02-D5. These characters will establish a unique sample identifier that can be used when evaluating data. Table 4-1 presents the character identifiers to be used in the sample and matrix portion of the contractor identification number. In all cases, the second letter indicates the sample matrix. Grab, composite, and undisturbed sample designations will be noted in the field logbook. Table 4-2 describes the field QC designator types.

**Table 4-1: Character Identifiers, New Apra Heights Disposal Area, Guam**

Identifier	Sample Type	Matrix
SV	Soil Gas	Vapor
SS	Surface Soil	Soil
TS	Trench	Soil
QS	Field QC	Soil
QW	Field QC	Water

**Table 4-2: QC Designator Types, New Apra Heights Disposal Area, Guam**

Identifier	QC Sample Type	Description
S	Normal Sample	All non-field QC Samples
G	Geotechnical	Sample to undergo geotechnical testing
D	Duplicate	Collocate (adjacent liners)
R	Replicate	Homogenized sample
E	Equipment Rinsate	Water
F	Field Blank	Water
T	Trip Blank	Analytical laboratory-prepared sample
X	Blind Spike	Performance evaluation sample

## 5. SITE-SPECIFIC SAMPLE HANDLING AND ANALYSIS

### 5.1 HANDLING AND STORAGE

Sample container lids and caps will be sealed with a non-solvent based adhesive tape and covered with custody seals. All samples will be recorded on the chain-of-custody forms in accordance with SOP III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*. Storage of samples will be performed according to SOP III-F, *Sample Handling, Storage, and Shipping Procedures*.

Coolers will be insulated with frozen gel packs or ice in double, self-sealing bags. Styrofoam pads will be used to cover the top and bottom insides of the cooler (pads may be placed on the sides as well at the discretion of field personnel). In the case of liquid samples, an absorbent material will be placed on the bottom of the cooler to help contain any spillage that might occur. To prevent breakage, glass containers will be wrapped in bubble-wrap, Styrofoam, or any other padded material. All empty spaces between containers should be filled with Styrofoam "peanuts" or any other appropriate padded material. Water sample containers will be packed in an upright position and not on their sides or stacked to prevent leakage. Ice and gel packs will be replaced at the time of shipment to keep the inside temperature of the cooler as close as possible to 4°C. Samples will be shipped within 24 hours to allow the lab to meet holding times for analysis.

### 5.2 SAMPLE CONTAINERS AND PRESERVATIVES

Table 5-1 outlines the compound to be tested and the type of container and preservation method to be used. A more detailed discussion of sample containers and preservatives can be found in the QAPP section of this SAP.

**Table 5-1: Containers and Preservatives, New Apra Heights Disposal Area, Guam**

Parameter	Matrix	Number x Container Type	Preservative
Volatile Organic Compounds (VOCs)	Soil	8-oz. glass jar	Cool to 4°C
	Water	3 x 40-ml vial w/Teflon lined septa	4°C/HCL to pH < 2
Semi-Volatile Organic Compounds (SVOCs)	Soil	8-oz. glass jar	Cool to 4°C
	Water	2 x 1-L amber glass w/Teflon-lined cap	Cool to 4°C
Total Petroleum Hydrocarbons (TPH)	Soil	8-oz. glass jar	Cool to 4°C
	Water	2 x 1-L amber glass w/Teflon-lined cap	Cool to 4°C
Chlorinated Pesticides/PCBs	Soil	8-oz. glass jar	Cool to 4°C
	Water	2 x 1-L amber glass w/Teflon-lined cap	Cool to 4°C
TAL Metals	Soil	8-oz. glass jar	Cool to 4°C
	Water	1 x 1-L polyethylene	HNO <sub>3</sub> pH < 2
Explosives	Soil	8-oz. glass jar	Cool to 4°C



### 5.3. SHIPPING

All appropriate DOT regulations will be followed for shipping passive soil gas, soil, and water samples. Couriers in Guam can pick up samples at the Site if arrangements are made prior to the pickup. Shipments can also be delivered directly to a courier at the airport. The coolers containing soil samples must receive approval from the USDA prior to shipping. All samples will be shipped in accordance with SOP III-F, *Sample Handling, Storage, and Shipping Procedures*.

#### 5.3.1 Hazardous Materials Shipment

Hazardous materials, as defined by the DOT, are not anticipated to be encountered. However, if they are, field personnel must classify samples and materials considered to be hazardous by referring to the Hazardous Materials Table (49 CFR 172.102 including Appendix A). All personnel shipping any hazardous material will be properly trained in the appropriate regulations as required by DOT HM-126F, *Training for Safe Transportation of Hazardous Materials*. This training will apply to the carriers as well. As per SOP III-F, *Sample Handling, Storage, and Shipping Procedures*, when shipping hazardous materials, including bulk chemicals or samples suspected of being hazardous, proper shipping papers, package markings, labeling, placarding, and packaging will comply with 49 CFR 172 Subpart C, D, E, and F.

Section 2.7 of the International Air Transport Association (IATA) publication *Dangerous Goods Regulations* states that very small quantities of certain dangerous goods may be transported without certain marking and documentation requirements as described in 49 CFR Part 172; however, certain labeling and packaging requirements must still be followed. The amounts of substances that can be shipped under this section are found in the IATA *List of Dangerous Goods*. A "Dangerous Goods in Expected Quantities" label must be filled out and attached to the cooler.

#### 5.3.2 Non-Hazardous Material

Samples considered to be non-hazardous based on previous Site sample results, field screening results, or visual observations may be shipped as non-hazardous. Environmental samples destined for analysis at an approved laboratory may also be shipped as non-hazardous. Two copies of the chain-of-custody forms will be placed in an adhesive plastic pouch and taped on the inside of the coolers. The coolers will then be sealed with waterproof tape and labeled "Fragile", "This End Up" (or directional arrows pointing up), and other appropriate notices. Coolers will also have custody seals placed on them according to SOP III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*.

#### 5.3.3 Shipments from Outside Continental United States

Sample shipments to the continental United States from outside the continental U.S. are subject to inspection and approval by the USDA. The analytical laboratory receiving the shipments must be have a USDA Soil Import Permit to be able to receive and properly dispose of soil. All coolers must be affixed with labels indicating the coolers contain environmental samples, which will then be inspected by a USDA representative. All coolers must possess shipping forms, which will be stamped by the USDA inspector prior to shipment. Samples from U.S. territorial possessions and foreign countries will be subject to clearance by U.S. Customs upon entry into the United States. If the commercial paperwork is in order, shipments can pass through Customs without requiring opening for inspection.

Soil import permits and the USDA approval letter will be supplied by the laboratory prior to mobilization. These items, along with courier shipping forms and commercial invoices, should be

stapled together and placed inside a clear, plastic pouch and affixed to the cooler. Custody seals will be supplied by the laboratory. These must be signed and dated by field personnel. A minimum of two seals must be placed so that they stick to both the cooler lid and body. Address labels stating the destination should be placed on each cooler. Upon laboratory receipt of the coolers, the lab technician will inspect the sample containers as per SOP III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*. The samples will either be removed from the containers for analysis or placed in a refrigerated storage area until they are analyzed.

### 5.3.4 Records

In accordance with SOP III-D, *Logbooks*, a bound field notebook with consecutively numbered, water-repellent pages will be maintained. The logbook will be clearly identified with the name of the activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries. Data forms, with predetermined formats for logging field data, will be incorporated into the logbook. This logbook will serve as the primary record of field activities. Logbooks will allow a reviewer to reconstruct applicable events by having entries made in chronological order and in sufficient detail. The logbook will be maintained in a clean area and used only when outer gloves have been removed. Entries on the data forms and in the logbook will meet the same requirements. Information to be recorded in the logbook is as follows:

- Date and time of all onsite activities
- Site location and description
- Weather conditions
- Field work documentation
- Field instrumentation readings
- Personnel present
- Photograph references
- Sample locations
- Sample EPA number and sample identification
- Sample naming
- Field QC sample information
- Field descriptions, equipment used, and field activities accomplished to reconstruct field operations
- Meeting information
- Important times and dates of telephone conversations, correspondence, or deliverables
- Field calculations

- PPE level
- Calibration records
- Subcontractors present
- Equipment decontamination procedures and effectiveness

The logbook will reference data maintained in other logs. Corrections to entry records will be done by drawing a single line through the incorrect entry, then initialing and dating the change. An explanation is to be included if more than a simple mistake was made. Entries will be signed or initialed by the individual making the entry at the end of each day. Page numbers will be entered on each logbook page. The preparer will photocopy completed pages weekly. A technical review of the logbook will be conducted by the field manager.

### 5.3.5 Health and Safety

Appropriate lifting techniques should be used. When lifting objects such as coolers, the legs should be used to help prevent straining the back. Dollies should also be used in the case of extreme weight of sample coolers. Proper hand protection should be used when handling sample containers to avoid possible contamination from materials that may have spilled out of the containers. For complete details concerning health and safety, consult the *Health and Safety Plan* (HSP) in the appendix to this SAP.

## 6. HANDLING AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

### 6.1 HANDLING

Anticipated IDW includes decontamination water generated during decontamination of the soil sampling equipment. IDW will be collected and drummed immediately. It will be handled and labeled according to this FSP and SOP I-A-7, *IDW Management*.

A decontamination station will be constructed to capture decontamination fluids. When the day's sampling activities have been completed, the trenching subcontractor will pump the decontamination water from the pit into DOT-approved IA2 drums. The drums will be labeled with the date and the trench number, in accordance with the SOP I-A-7, *IDW Management*. Drums containing IDW will be stored on pallets at a designated staging area and covered with tarps. Drums will be inventoried daily. Approximately 10 drums of IDW (decontamination water) will be generated during the field investigation. Upon completion of field activities, a final inventory of the drums will be conducted to ensure that they are labeled correctly and have been removed to a staging area to await disposal. Soil excavated during trenching will be returned to the trenches in roughly the same order as it was excavated. Because sampling personnel will not enter the trenches, personal protective equipment (PPE) is unlikely to become heavily soiled; consequently, PPE will be decontaminated as appropriate, collected in plastic trash bags, and disposed of as solid waste.

### 6.2 DISPOSAL

A contractor will dispose of all IDW within 90 calendar days of completing the field activities. Should IDW require disposal as a hazardous waste, the contractor will develop an IDW disposal plan for the screening, sampling, chemical analysis, and disposal of the waste. Given the Site data, no hazardous waste is expected; therefore, no effort to prepare an IDW disposal plan has been included. Only decontamination water will require assessment and disposal.

In accordance with the Resource Conservation and Recovery Act of 1976 (RCRA) and requirements of the Navy Public Works Center, two representative samples of the drummed water will be collected and analyzed to evaluate disposal options. The contractor will evaluate the IDW inventory and analytical data from the RI and cross-reference it to selected IDW disposal methods. The contractor will prepare and submit a report summarizing the disposal program. All pertinent manifests and disposal documentation will be attached to the report.

## 7. REFERENCES

- Department of the Navy (DON). 1996. *Project Procedures Manual, U.S. Navy PACNAVFACENG-COM Installation Restoration Program*. PACNAVFACENGCOM. September.
- Earth Tech, Inc. (Earth Tech). 1998. *Draft Work Plan, Abbreviated Remedial Investigation, New Apra Heights Disposal Area, COMNAVMARIANAS, Guam*. April.
- . 1998. *Draft Health and Safety Plan, Abbreviated Remedial Investigation, New Apra Heights Disposal Area, COMNAVMARIANAS, Guam*. April.
- U.S. Environmental Protection Agency (USEPA). 1995a. *Contract Laboratory Program, Statement of Work for Organics Analysis*. OLM03.1
- . 1995b. *Contract Laboratory Program, Statement of Work for Inorganic Analysis*. ILM04.0
- . 1997. *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*.

**Comprehensive Long-Term Environmental Action Navy (CLEAN)  
Contract No. N62742-94-D-0048  
Contract Task Order No. 0030**

**Draft Quality Assurance Project Plan  
Abbreviated  
Remedial Investigation  
New Apra Heights Disposal Area  
COMNAVMARIANAS, Guam**

**Prepared for**

**Department of the Navy  
Commander, Pacific Division  
Naval Facilities Engineering Command  
Pearl Harbor, Hawaii 96860-7300**

**Prepared by**

**Earth Tech, Inc.  
700 Bishop Street, Suite 900  
Honolulu, Hawaii 96813**

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## ACRONYMS AND ABBREVIATIONS

ARARs	applicable or relevant and appropriate regulations
bgs	below ground surface
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	contract laboratory program
CTO	Contract Task Order
DoD	Department of Defense
DON	Department of the Navy
DQO	data quality objectives
Earth Tech	Earth Tech, Inc.
EDD	electronic data deliverable
FSP	Field Sampling Plan
HPLC	high pressure liquid chromatography
IR	Installation Restoration
LCS	laboratory control standards
MS	matrix spike
MSA	Master Service Agreements
MSD	matrix spike duplicate
NFESC	Naval Facilities Engineering Service Center
OVA	organic vaporizer analyzer
PACNAVFACENGCOM	Pacific Division, Naval Facilities Engineering Command
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyls
PID	photo-ionization detector
PRE	preliminary risk assessment
PRGs	preliminary remediation goals
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act of 1976
RI	Remedial Investigation
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SCR	sample condition upon receipt
SDG	sample delivery group
SRA	sample recovery hand auger
SOP	standard operating procedure
SOW	statement of work
SVOC	semi-volatile organic compounds

TBC	to be considered
TCL	target compound list
TPH	total petroleum hydrocarbon
µg/kg	microgram per kilogram
USEPA	U.S. Environmental Protection Agency
VOA	volatile organic analysis
VOC	volatile organic compounds

## 1. INTRODUCTION

At the request of the Pacific Division, Naval Facilities Engineering Command (PACNAVFAC-ENGCOM), Earth Tech, Inc. (Earth Tech) has prepared a Sampling and Analysis Plan (SAP), consisting of Part I, Field Sampling Plan (FSP) and Part II, Quality Assurance Project Plan (QAPP) for contract task order (CTO) 0030 of the Comprehensive Long-Term Environmental Action Navy (CLEAN II) program. The SAP covers an abbreviated remedial investigation (RI) at the New Apra Heights Disposal Area (the "Site"), Guam.

The purpose of the RI is to characterize the nature and extent of environmental contamination resulting from past disposal and burial practices at the Site. The Department of Defense (DoD) Base Realignment and Closure Act (BRAC) of 1990 requires the Site to be investigated and, if necessary, cleaned up, before the property is transferred to the local community. Earth Tech will investigate the site in accordance with the presidential mandate, "Fast-Track Cleanup at Closing Installations."

The SAP is based on the Statement of Work, dated November 18, 1997 (DON 1997). This QAPP supports the data collection activities by defining standards and criteria against which the data can be measured to determine acceptable environmental quality given the intended future land use. The QAPP discusses procedures and methods referenced in the FSP, as follows:

- Method selection and analyte target lists
- Laboratory and field quality assurance measurements and acceptance criteria
- Field and laboratory documentation and data management
- Data validation requirements
- Data evaluation procedures
- Performance and system audits
- Preventative maintenance
- Corrective actions
- Quality assurance/quality control reporting

Information about sample designation, field methodologies, and the handling of any investigation-derived waste is also included in the FSP. The QAPP contains project quality assurance and quality control (QA/QC) objectives and procedural guidelines for the sampling, analytical and QC activities implemented during the RI. The purpose of these guidelines is to ensure (a) the procedures used in the RI will not detract from the quality of results, and (b) all activities, findings, and results follow an approved plan and are properly documented.

### 1.1 SITE BACKGROUND

The New Apra Heights Disposal Area is located in the west-central portion of the Island of Guam, Mariana islands (see Figure 1-1). The southwestern portion of the Site is located on the New Apra Heights parcel, while the northeastern portion of the Site is located on the adjacent Building 4175 parcel. Both of these parcels are owned and operated by the Commander, U.S. Naval Forces Marianas (COMNAVMAIANAS), Guam (formerly Naval Activities [NAVACTS]); however, only the New Apra Heights parcel will be investigated as part of this RI. This parcel will be referred to as the "Site."

The property, now leased by the Government of Guam from the U.S. Government, historically was used by the Navy's 129th Construction Battalion as a motor pool and storage yard and by the Army's 53rd Regiment as a base. An Army Field Hospital may also have been located on this property. A geophysical survey conducted by Earth Tech confirmed the presence of buried debris at the Site (Earth Tech 1997a). Organic debris, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides and polychlorinated byphenyls (PCBs), and total petroleum hydrocarbons (TPHs) have been detected at the adjacent property in previous investigations conducted by Ogden and Pacific Basin Environmental Consultants. Details of these investigations are located in the Work Plan (WP) (Earth Tech 1998).

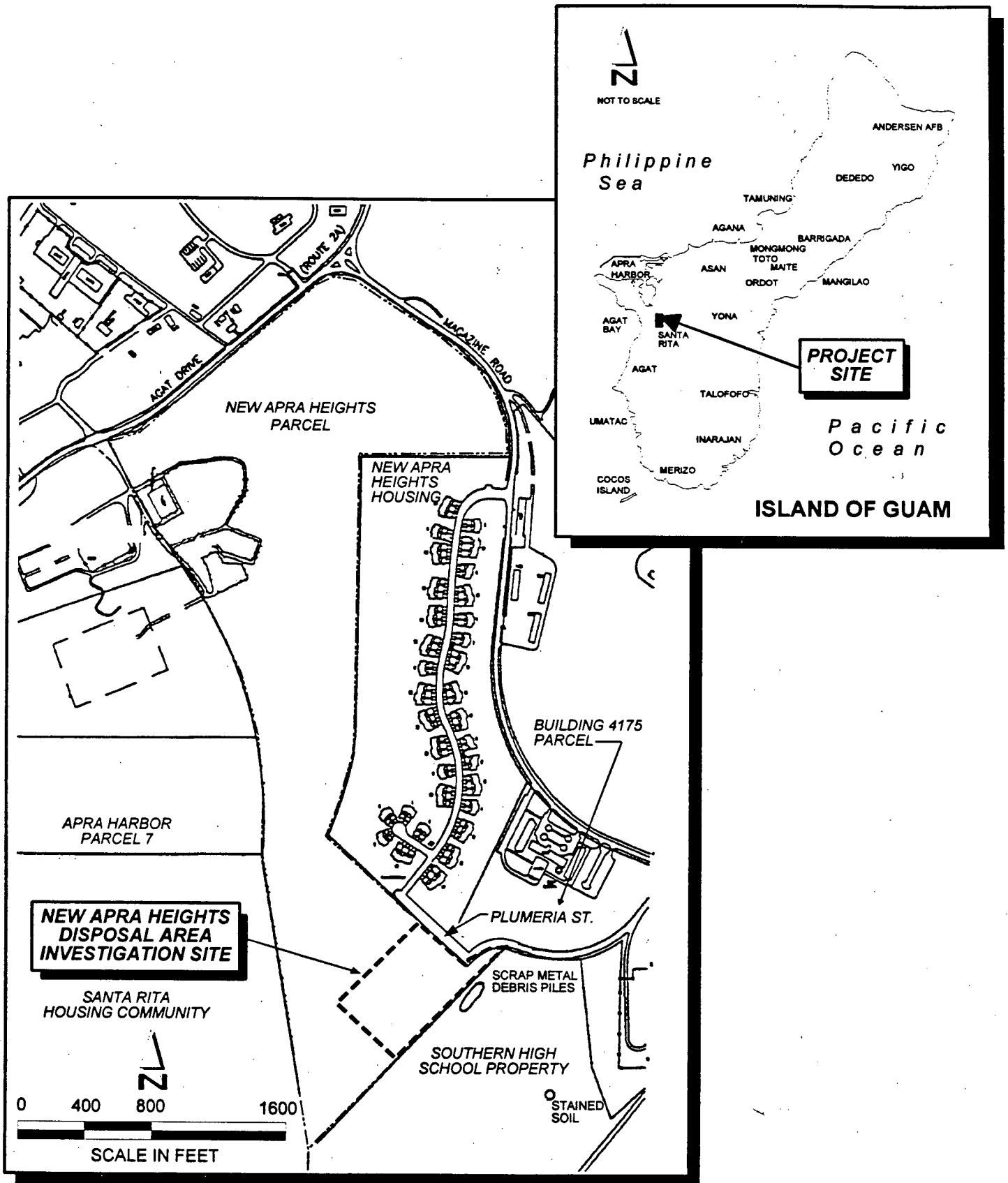
## **1.2 DATA QUALITY OBJECTIVES**

The data quality objectives (DQOs) for the Site were developed using the USEPA Data Quality Objectives Process (USEPA 1994) and are detailed in Section 4.2 of the Work Plan. In general, the project-specific DQOs are to determine if the chemicals of potential concern (COPCs) exceed the applicable or relevant and appropriate regulations (ARARs) or to-be-considered requirements (TBCs) identified in the Work Plan (WP) and if there is an unacceptable risk associated with the COPCs to human health and the environment. The presence and concentration of the COPCs at the Site will be determined by analysis of soil gas and surface and subsurface soil samples. COPCs detected above the decision thresholds will require further action. COPCs not detected or below the decision thresholds will be removed from further consideration.

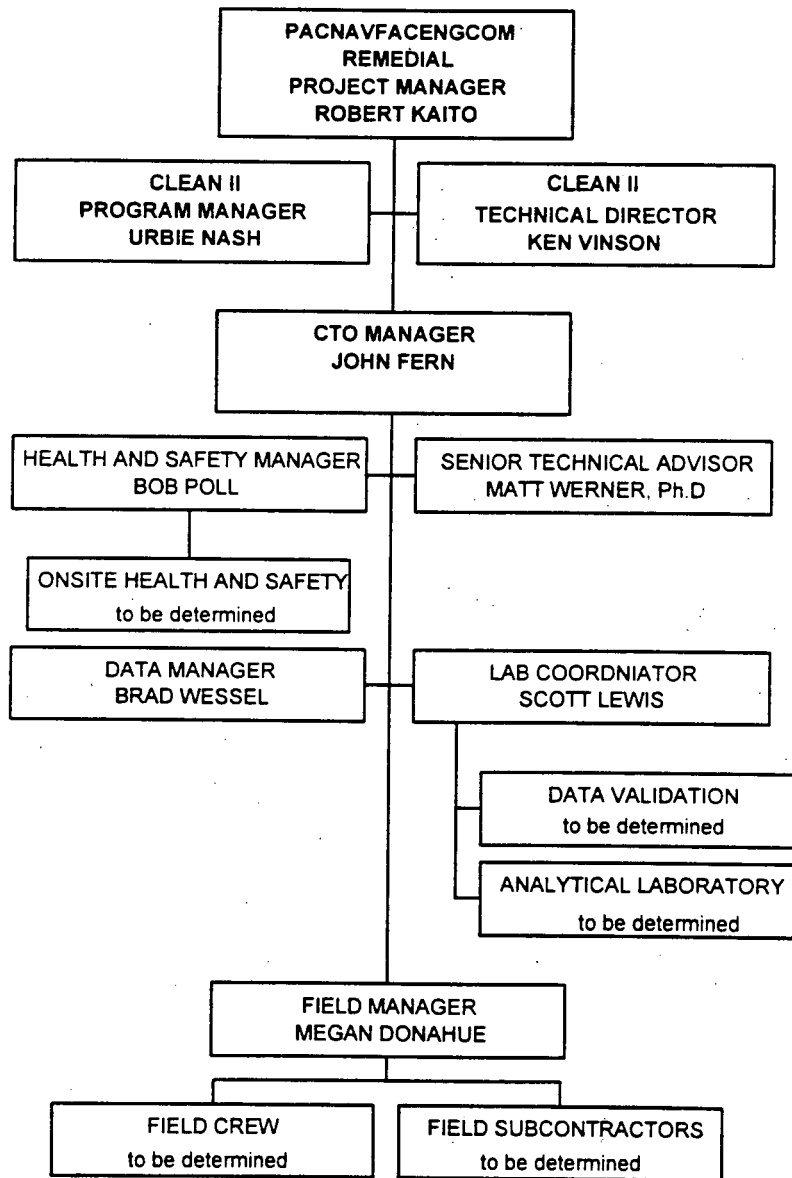
## **1.3 PROJECT ORGANIZATION**

Project personnel will consist of a CTO manager, a field manager, a field health and safety manager, a QA/QC reviewer, and other Earth Tech personnel as shown in Figure 1-2.

**Figure 1-1: Site Location Map**  
New Apra Heights Disposal Area  
Guam



**Figure 1-2 Project Organization Chart**



## 2. SAMPLING AND SAMPLE HANDLING PROCEDURES

The following summarizes sample collection, handling, shipping, and storage procedures. Detailed procedures may be found in the FSP and in the *Project Procedures Manual, U.S. Navy PACNAVFACENGCOM Installation Restoration Program (IRP) (DON 1996)*.

### 2.1 SAMPLE COLLECTION METHODS

Samples will be collected in accordance with the following procedures:

- *Sample Naming, I-A-9*
- *Soil Gas Survey I-B-3*
- *Soil Sampling, I-B-1*

Passive soil gas probe samples will be collected approximately 2 weeks after being placed in the ground following a triangular grid with 50-foot spacing.

Surface soil samples will be collected at approximately 6–12 inches below ground surface (bgs) using a soil recovery hand auger (SRA) consisting of a metal rod, handle-detachable stainless steel core barrel, and pre-cleaned sample liners. Subsurface soil samples will be collected at approximately 5–10 feet bgs from trenches dug by a backhoe. For safety considerations, the subsurface soil samples will be collected from the backhoe bucket.

Specific field procedures, location of sample collection points, and project-specific modifications of the standard operating procedures (SOPs) are presented in Section 2 of the FSP.

The numbers of field and QC samples to be collected are summarized in Table 2-1.

### 2.2 QUALITY CONTROL OF SAMPLE COLLECTION

Quality of samples collected in the field will be assured through the use of trained sampling personnel, documented and standardized procedures, second-party review of field logs and notes, and collection of field quality control samples.

The procedure for collecting field quality control samples will be determined by the intended use of the data and Procedure III-B, *Field QC Samples*. Table 2-1 shows the planned field quality control samples for each event. Evaluation of the field QC data is discussed in Section 4.

#### 2.2.1 Field Replicates

Twelve soil gas replicate probes will be installed throughout the grid pattern and placed as close as possible (within vendor specifications) to the original samples. Two field replicates of surface and subsurface soil samples will be collected as close as possible in time and location to the original samples. The field crew will take care to duplicate sampling conditions for each container in the replicate set. Because volatile compounds are on the target list, the soil samples will not be homogenized before being placed in the sample container.

Table 2-1 Sampling and Analysis Plan Summary, New Apra Heights Disposal Area

Analysis	Method	Number of Samples					Total
		Field Samples	Field Replicates	Field Blanks	Equipment Rinsate	Trip Blanks	
Passive Soil Gas Sampling and Analysis							
Volatile Organic Compounds (VOCs)	SW 846 8021	120	12	1	—	1	134
Semi-volatile Organic Compounds (SVOCs)	SW 846 8270B	120	12	1	—	—	133
Surface Soil Sampling and Analysis							
Total Petroleum Hydrocarbons (TPH)	SW-846 8015B	26	3	1	2	3	35
VOCs	CLP OLM03.1	26	3	1	2	3	35
SVOCs	CLP OLM03.1	26	3	1	2	NR	32
Pesticides/PCBs	CLP OLM03.1	26	3	1	2	NR	32
TAL Metals	CLP ILM 4.0	26	3	1	2	NR	32
Explosives	SW-846 8330	26	3	1	2	NR	32
Subsurface Soil Sampling and Analysis							
Total Petroleum Hydrocarbons (TPH)	SW-846 8015B	21	3	1	4	7	36
VOCs	CLP OLM03.1	21	3	1	4	7	36
SVOCs	CLP OLM03.1	21	3	1	4	NR	29
Pesticides/PCBs	CLP OLM03.1	21	3	1	4	NR	29
TAL Metals	CLP ILM 4.0	21	3	1	4	NR	29
Explosives	SW-846 8330	21	3	1	4	NR	29

— = not applicable

NR = not required

### 2.2.2 Field Blanks

Two field blanks will be collected during the project event to represent potential contamination resulting from the soil gas probes and water used for the final rinse during soil sampling decontamination procedures.



### 2.2.3 Equipment Rinsates

Equipment rinsates will be collected during each event to assess possible contribution of analytes from sample collection equipment. Decontamination final rinse water will be poured through clean equipment, collected, and submitted for analysis.

### 2.2.4 Trip Blanks

To assess potential contamination of samples during shipping, trip blanks will be submitted for analysis of volatile organic compounds. Trip blanks will consist of volatile organic analysis (VOA) containers filled at the laboratory and shipped with the VOA sample bottles. The trip blanks will be labeled in the field, entered on the chain-of-custody report, and submitted for analysis. They will not be opened in the field, but will be kept with the containers and VOA samples at all times. Use of the data is discussed in Section 4.

## 2.3 SAMPLE CONTAINERS

Table 2-2 summarizes sample containers and volumes required for the analyses. These may be changed to accommodate selected laboratory preferences but will still meet the essential requirements of the method.

## 2.4 SAMPLE LOGS, LABELING, AND CHAIN-OF-CUSTODY

Sample logs, labels, and chain-of-custody reports will be completed in accordance with SOPs III-D, *Logbooks*, and III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody*.

## 2.5 SAMPLE HANDLING, STORAGE, AND TRANSPORT

Samples will be handled, shipped, and stored according to SOP III-F, *Sample Handling, Storage, and Shipping Procedures*.

Immediately following sample collection and labeling, samples will be placed in an insulated cooler with frozen gel packs (blue ice). Temperatures in the cooler will be maintained to  $4 \pm 2^\circ\text{C}$  by placing a layer of ice on the bottom of the cooler followed by a layer of samples and then a layer of ice packs. Prior to shipment, the frozen gel packs in the coolers will be replaced with new frozen gel packs to maintain a  $4 \pm 2^\circ\text{C}$  temperature range. To further help insulation, Styrofoam pads will be placed on both the bottom and the top of the cooler. Samples will be shipped to the laboratory via an express delivery service (such as Federal Express or equivalent) within 24 hours of collection.

**Table 2-2 Requirements for Sample Preservation, Maximum Holding Time, and Containers**

Parameter	Matrix	Analytical Method	Preservation	Maximum Holding Time	Number x Sample Container Type
VOCs	Soil	CLP OLM 3.1	$4^\circ\text{C}$	14 days <sup>a</sup>	8-oz. glass jar
	Water	CLP OLM 3.1	$4^\circ\text{C}/\text{HCL}$ to $\text{pH} < 2$	14 days <sup>a</sup>	3 x 40-ml vial w/ Teflon lined septa
SVOCs	Soil	CLP OLM 3.1	$4^\circ\text{C}$	14 days <sup>b</sup> / 40 days <sup>c</sup>	8-oz. glass jar
	Water	CLP OLM 3.1	$4^\circ\text{C}$	7 days <sup>b</sup> / 40 days <sup>c</sup>	2 x 1-L amber glass w/ Teflon lined cap

**Table 2-2 Requirements for Sample Preservation, Maximum Holding Time, and Containers**

Parameter	Matrix	Analytical Method	Preservation	Maximum Holding Time	Number x Sample Container Type
Total Fuel Hydrocarbons (TFH)	Soil	SW8015B	4°C	14 days <sup>a</sup>	8-oz. glass jar
	Water	SW8015B	4°C	7 days <sup>b</sup> / 40 days <sup>c</sup>	2 x 1-L amber glass w/ Teflon lined cap
Pesticides/PCBs	Soil	CLP OLM 3.1	4°C	14 days <sup>b</sup> / 40 days <sup>c</sup>	8-oz. glass jar
	Water	CLP OLM 3.1	4°C	7 days <sup>b</sup> / 40 days <sup>c</sup>	2 x 1-L amber glass w/ Teflon lined cap
TCL Metals	Soil	CLP ILM 4.0	4°C	6 months/ 28 days <sup>d</sup>	8-oz glass jar
	Water	CLP ILM 4.0	HNO <sub>3</sub> pH<2	6 months/28 days <sup>d</sup>	1 x 1-L polyethylene
Explosives	Soil	SW-846 8330	4°C	14 days <sup>b</sup> / 40 days <sup>c</sup>	8-oz. glass jars
	Water	SW-846 8330		7 days <sup>b</sup> / 40 days <sup>c</sup>	2 x 1-L amber glass w/ Teflon lined cap

<sup>a</sup> from sample collection to analysis<sup>b</sup> from sample collection to extraction<sup>c</sup> from extraction to analysis<sup>d</sup> 28 days for sample collection to analysis for mercury

## 2.6 SAMPLE CUSTODY

Standard sample custody procedures will be used to maintain the quality of samples during collection, transport, and storage prior to analysis in accordance with the following procedures:

- *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures III-E*
- *Sample Handling, Storage, and Shipping Procedures III-F*

The field team leader will ensure all samples are handled properly to maintain the integrity of the samples from time of collection until shipment. Custody seals will be signed then placed over each sample container and cooler to allow detection of tampering.

Upon receipt, the laboratory will sign and retain copies of the air bill. On the chain-of-custody record is a list of analyses to be performed and a space to record sample condition upon receipt. The laboratory will sign the chain-of-custody form and record the temperature of the samples or cooler on the chain-of-custody form and on the Sample Condition upon Receipt (SCR) form. All samples requiring preservative will be checked for proper preservation by measuring pH. In the event of breakage or discrepancies between the chain-of-custody form, sample labels, or requested analysis, the sample custodian will notify the laboratory project manager. A nonconformance report will be completed, and the project chemist will be notified within 24 hours. At the time of notification, corrective action will be chosen. The sample custodian will enter the information into the laboratory system, and a log-in confirmation sheet will be sent to the project chemist within 48 hours. The laboratory will send the project chemist a written declaration of the samples in each sample delivery group (SDG).

### 3. DATA COLLECTION QUALITY ASSURANCE

Field and laboratory data will be collected according to standard procedures and the requirements of this investigation. This section summarizes the procedures required to meet the established data quality objectives.

#### 3.1 FIELD MEASUREMENTS

Organic vapor analyzers (OVAs) and photoionization detectors (PIDs) will be calibrated in accordance with the manufacturer's instructions. The OVA and PID detectors will be used to monitor health and safety during the field activities as well as aid in the determination of sample collection locations.

Field data will be recorded in field notebooks as described in Procedure III-D, *Logbooks*. Field logbooks will be permanently bound with consecutively pre-numbered pages. Entries will be made in indelible ink. Anyone making a correction will do so by drawing a single line through the incorrect entry and initialing and dating the correction. Upon completion of field activities, the original logbook will be placed in the project files. Field data presented in reports will be verified against the original logbooks.

#### 3.2 LABORATORY MEASUREMENTS

Samples will be submitted to an NFESC-evaluated laboratory for analysis by methods cited in Table 2-1. Laboratory data quality strategies and criteria were developed in accordance with the project DQOs and the following references:

- Navy Installation Restoration Quality Assurance Guide, February 1996 (NFESC 1996)
- Laboratory Data Validation Functional Guidelines for Evaluating Organic Analysis (USEPA 1994a)
- Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analysis (USEPA 1994b)
- Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (USEPA 1997a)
- Contract Laboratory Program (CLP) Statement of Work for Organics Analysis OLM03.1 (USEPA 1995a)
- Contract Laboratory Program, Statement of Work for Inorganic Analysis ILM04.0 (USEPA 1995b)

##### 3.2.1 Target Detection Limits

The laboratory selected for this project will be required to achieve minimum detection limits that will enable the project objectives to be achieved. Table 3-1 lists the project target detection limits and decision thresholds.

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
VOCs and SVOCs by SW-846 8260/8270 (USEPA 1996) (Soil gas) (µg)					
Methyl t-butyl ether	—	1.0E+00	—	—	—
trans-1,2-dichloroethene	—	1.3E-01	—	—	—
1,1-dichloroethane	—	1.7E-01	—	—	—
cis-1,2-dichloroethene	—	9.0E-02	—	—	—
Chloroform	—	7.0E-02	—	—	—
1,1,1-trichloroethane	—	2.8E-01	—	—	—
1,2-dichloroethane	—	7.0E-02	—	—	—
Benzene	—	8.0E-02	—	—	—
Carbon Tetrachloride	—	2.1E-01	—	—	—
Trichloroethene	—	5.0E-02	—	—	—
Toluene	—	5.0E-02	—	—	—
Octane	—	7.0E-02	—	—	—
Tetrachloroethene	—	5.0E-02	—	—	—
Chlorobenzene	—	4.0E-02	—	—	—
Ethylbenzene	—	4.0E-02	—	—	—
m-,p-xylene	—	5.0E-02	—	—	—
o-xylene	—	4.0E-02	—	—	—
Phenol	—	4.0E-02	—	—	—
1,3,5-trimethylbenzene	—	5.0E-02	—	—	—
1,2,4-trimethylbenzene	—	3.0E-02	—	—	—
1,4-dichlorobenzene	—	4.0E-02	—	—	—
2-methyl phenol	—	4.0E-02	—	—	—
Undecane	—	2.0E-02	—	—	—
Naphthalene	—	5.0E-02	—	—	—
Tridecane	—	3.0E-02	—	—	—
2-methyl naphthalene	—	4.0E-02	—	—	—
Pentadecane	—	3.0E-02	—	—	—
Acenaphthylene	—	1.2E-01	—	—	—
Acenaphthene	—	1.3E-01	—	—	—
Fluorene	—	1.1E-01	—	—	—

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
VOCs by CLP OLM 3.1 (USEPA 1995a) (Soil) (mg/kg)					
Acetone	8.8E+03	1.0E-02	—	—	
Benzene	1.4E+00	1.0E-02	21	66–142	
Bromodichloromethane	1.4E+00	1.0E-02	—	—	
Bromoform	2.4E+02	1.0E-02	—	—	
Bromomethane	2.3E+01	1.0E-02	—	—	
2-Butanone (MEK)	2.7E+04	—	—	—	
Carbon disulfide	2.4E+01	1.0E-02	—	—	
Carbon tetrachloride	5.0E-01	1.0E-02	—	—	
Chlorobenzene	2.2E+02	1.0E-02	21	60–133	
Chloroethane	1.6E+03	1.0E-02	—	—	
Chloroform	5.3E-01	1.0E-02	—	—	
Chloromethane	2.6E+00	1.0E-02	—	—	
Dibromochloromethane	2.3E+01	1.0E-02	—	—	
1,1-Dichloroethane	1.7E+03	1.0E-02	—	—	
1,2-Dichloroethane	5.5E-01	1.0E-02	—	—	
1,1-Dichloroethene	8.0E-02	1.0E-02	22	59–172	
1,2-Dichloroethene (total)	1.2E+02	1.0E-02	—	—	
1,2-Dichloropropane	6.8E-01	1.0E-02	—	—	
cis-1,3-Dichloropropene	—	1.0E-02	—	—	
trans-1,3-Dichloropropene	—	1.0E-02	—	—	
Ethyl benzene	2.3E+02	1.0E-02	—	—	
2-Hexanone	—	1.0E-02	—	—	
4-Methyl-2-pentanone (MIBK)	2.8E+03	1.0E-02	—	—	
Methylene chloride	1.8E+01	1.0E-02	—	—	
1,1,2,2-Tetrachloroethane	1.1E+00	1.0E-02	—	—	
Tetrachloroethene	1.7E+01	1.0E-02	—	—	
Toluene	8.8E+02	1.0E-02	21	59–139	
1,1,1-Trichloroethane	3.0E+03	1.0E-02	—	—	
1,1,2-Trichloroethane	1.5E+00	1.0E-02	—	—	
Styrene	6.8E+02	1.0E-02	—	—	
Trichloroethene	7.0E+00	1.0E-02	24	62–137	

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
Vinyl chloride	3.5E-02	1.0E-02	—	—	—
Total Xylenes	3.2E+02	1.0E-02	—	—	—
<u>Surrogates</u>					
Bromofluorobenzene	—	—	—	59–113	—
1,2-Dichloroethane-d4	—	—	—	70–121	—
Toluene-d8	—	—	—	84–138	—
SVOCs by USEPA CLP OLM03.1 (USEPA 1995a) (Soil) (mg/kg)					
1,2,4-trichlorobenzene	5.5E+03	3.3E-01	23	38–107	—
1,2-dichlorobenzene	7.0E+02	3.3E-01	—	—	—
1,3-dichlorobenzene	8.6E+02	3.3E-01	—	—	—
1,4-dichlorobenzene	8.5E+00	3.3E-01	27	28–104	—
2,2'-oxybis(1-chloropropane)	—	3.3E-01	—	—	—
2,4,5-trichlorophenol	6.8E+04	8.0E-01	—	—	—
2,4,6-trichlorophenol	1.7E+02	3.3E-01	—	—	—
2,4-dichlorophenol	2.0E+03	3.3E-01	—	—	—
2,4-dimethylphenol	1.4E+04	3.3E-01	—	—	—
2,4-dinitrophenol	1.4E+03	8.0E-01	—	—	—
2,4-dinitrotoluene	1.4E+03	3.3E-01	47	28–89	—
2,6-dinitrotoluene	6.8E+02	3.3E-01	—	—	—
2-chloronaphthalene	1.1E+02	3.3E-01	—	—	—
2-chlorophenol	3.7E+02	3.3E-01	50	25–102	—
2-methylnaphthalene	—	3.3E-01	—	—	—
2-methylphenol	3.4E+04	3.3E-01	—	—	—
2-nitroaniline	4.1E+01	8.0E-01	—	—	—
2-nitrophenol	—	3.3E-01	—	—	—
3,3'-dichlorobenzidine	4.2E+00	3.3E-01	—	—	—
3-nitroaniline	—	8.0E-01	—	—	—
4,6-dinitro-2-methylphenol	—	8.0E-01	—	—	—
4-bromophenyl-phenylether	—	3.3E-01	—	—	—
4-chloro-3-methylphenol	—	3.3E-01	33	26–103	—
4-chloroaniline	2.7E+03	3.3E-01	—	—	—
4-chlorophenyl-phenylether	—	3.3E-01	—	—	—

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
4-methylphenol	3.4E+03	3.3E-01	—	—	—
4-nitroaniline	—	8.0E-01	—	—	—
4-nitrophenol	—	8.0E-01	50	11–114	—
Acenaphthene	1.1E+02	3.3E-01	19	31–137	—
Acenaphthylene	—	3.3E-01	—	—	—
Anthracene	5.7E+00	3.3E-01	—	—	—
Benzo(a)anthracene	2.6E+00	3.3E-01	—	—	—
Benzo(a)pyrene	2.6E-01	3.3E-01	—	—	—
Benzo(b)fluoranthene	2.6E+00	3.3E-01	—	—	—
Benzo(g,h,i)perylene	—	3.3E-01	—	—	—
Benzo(k)fluoranthene	2.6E+01	3.3E-01	—	—	—
Bis(2-chloroethoxy)methane	—	3.3E-01	—	—	—
Bis(2-chloroethyl)ether	9.7E-02	3.3E-01	—	—	—
Bis(2-ethylhexyl)phthalate	1.4E+02	3.3E-01	—	—	—
Butylbenzylphthalate	9.3E+02	3.3E-01	—	—	—
Carbazole	9.5E+01	3.3E-01	—	—	—
Chrysene	7.2E+00	3.3E-01	—	—	—
Di-n-butylphthalate	6.8E+04	3.3E-01	—	—	—
Di-n-octylphthalate	1.0E+04	3.3E-01	—	—	—
Dibenzo(a,h)anthracene	2.6E-01	3.3E-01	—	—	—
Dibenzofuran	1.4E+02	3.3E-01	—	—	—
Diethylphthalate	1.0E+05	3.3E-01	—	—	—
Dimethylphthalate	1.0E+05	3.3E-01	—	—	—
Fluoranthene	2.7E+04	3.3E-01	—	—	—
Fluorene	9.0E+01	3.3E-01	—	—	—
Hexachlorobenzene	1.2E+00	3.3E-01	—	—	—
Hexachlorobutadiene	2.4E+01	3.3E-01	—	—	—
Hexachlorocyclopentadiene	4.6E+03	3.3E-01	—	—	—
Hexachloroethane	1.4E+02	3.3E-01	—	—	—
Indeno(1,2,3-c,d)pyrene	2.6E+00	3.3E-01	—	—	—
Isophorone	2.0E+03	3.3E-01	—	—	—
N-nitroso-di-n-propylamine	1.4E+02	3.3E-01	38	41–126	—
N-nitrosodiphenylamine	3.9E+02	3.3E-01	—	—	—

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
Naphthalene	2.4E+02	3.3E-01	—	—	—
Nitrobenzene	9.4E+01	3.3E-01	—	—	—
Pentachlorophenol	7.9E+00	8.0E-01	47	17-109	—
Phenanthrene	—	3.3E-01	—	—	—
Phenol	1.0E+05	3.3E-01	35	26-90	—
Pyrene	—	3.3E-01	36	35-142	—
<u>Surrogate</u>					
Nitrobenzene-d5	—	3.3E-01	—	23-120	—
2-fluorobiphenyl	—	3.3E-01	—	30-115	—
Terphenyl-d14	—	3.3E-01	—	18-137	—
Phenol-d5	—	3.3E-01	—	24-113	—
2-fluorophenol	—	3.3E-01	—	25-121	—
2,4,6-tribromophenol	—	3.3E-01	—	19-122	—
2-chlorophenol	—	3.3E-01	—	20-130	—
1,2-dichlorobenzene-d4	—	3.3E-01	—	20-130	—
Pesticides/PCBs by CLP OLM03.1 (USEPA 1995b) (Soil) (mg/kg)					
Alpha-BHC	3.0E-01	1.7E-03	—	—	—
Beta-BHC	1.1E+00	1.7E-03	—	—	—
Delta-BHC	1.1E+00	1.7E-03	—	—	—
Gamma-BHC (Lindane)	1.5E+00	1.7E-03	50	46-127	—
Heptachlor	4.2E-01	1.7E-03	31	35-130	—
Aldrin	1.1E-01	1.7E-03	43	34-132	—
Heptachlor Epoxide	2.1E-01	1.7E-03	—	—	—
Endosulfan I	4.1E+03	1.7E-03	—	—	—
Dieldrin	1.2E-01	3.3E-03	38	31-134	—
4,4'-DDE	5.6E+00	3.3E-03	—	—	—
Endrin	2.0E+02	3.3E-03	45	42-139	—
Endosulfan II	4.1E+03	3.3E-03	—	—	—
4,4'-DDD	7.9E+00	3.3E-03	—	—	—
Endosulfan Sulfate	—	3.3E-03	—	—	—
4,4'-DDT	5.6E+00	3.3E-03	50	23-134	—
Methoxychlor	3.4E+03	1.7E-02	—	—	—
Endrin Ketone	—	3.3E-03	—	—	—



### **3.2.2 Holding times**

The laboratory will adhere to holding times shown in Table 2-1.

### **3.2.3 Calibration Procedures**

The laboratories are required to document calibration procedures in accordance with NFESC guidance (NFESC 1996) and the Program Master Services Agreement (MSA) (Earth Tech 1997b). Calibration procedures will be consistent with specified method requirements.

### **3.2.4 Preventive Maintenance**

The laboratory will perform preventative maintenance on instruments used to analyze project samples. The laboratory will keep records of all maintenance. Preventative maintenance documentation is incorporated into laboratory certification requirements and is an element of the subcontractor laboratory Quality Assurance Plan, which was reviewed and approved prior to selection as a CLEAN II subcontractor laboratory.

### **3.2.5 Laboratory Quality Control**

The laboratory will perform the following quality control checks in accordance with the cited methods:

- Method or reagent blanks
- Matrix spikes
- Duplicates or matrix spike duplicates
- Surrogates
- Blank spikes or laboratory control samples

In the absence of laboratory-specific acceptance criteria, the values shown in Table 3-1 will be used to validate the data and determine the acceptability for the project goals. Data quality management is discussed further in Section 5.

One temperature blank sample consisting of a filled 40-ml vial will be added to each cooler containing samples. The temperature blank will be used only to measure the representative temperature of the samples within the cooler.

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
Endrin Aldehyde	—	3.3E-03	—	—	—
Alpha-chlordane	1.5E+00	1.7E-03	—	—	—
Gamma-chlordane	1.5E+00	1.7E-03	—	—	—
Toxaphene	1.7E+00	1.7E+02	—	—	—
Aroclor 1016	6.5E+01	3.3E-02	—	—	—
Aroclor 1221	—	6.7E-02	—	—	—
Aroclor 1232	—	3.3E-02	—	—	—
Aroclor 1242	—	3.3E-02	—	—	—
Aroclor 1248	—	3.3E-02	—	—	—
Aroclor 1254	1.9E+00	3.3E-02	—	—	—
Aroclor 1260	—	3.3E-02	—	—	—
<u>Surrogate</u>					
Tetrachloro-m-xylene	—	—	—	60–150	—
Decachlorobiphenyl	—	—	—	60–150	—
Target Analyte List, CLP ILM04.0 (USEPA 1995b) (soil ) (mg/kg)					
Aluminum	1.0E+05	4.0E+01	20	75–125	75–125
Antimony	6.8E+02	1.2E+01	20	75–125	75–125
Arsenic	2.4E+00	2.0E+00	20	75–125	75–125
Barium	1.0E+05	4.0E+01	20	75–125	75–125
Beryllium	1.1E+00	1.0E+01	20	75–125	75–125
Cadmium	8.5E+02	1.0E+00	20	75–125	75–125
Calcium	—	1.0E+03	20	75–125	75–125
Chromium	6.4E+01	2.0E+00	20	75–125	75–125
Cobalt	9.7E+04	1.0E+01	20	75–125	75–125
Copper	6.3E+04	5.0E+00	20	75–125	75–125
Iron	—	2.0E+01	20	75–125	75–125
Lead	1.0E+03	6.0E-01	20	75–125	75–125
Magnesium	—	1.0E+03	20	75–125	75–125
Manganese	4.3E+04	3.0E+00	20	75–125	75–125
Mercury	—	—	20	75–125	75–125
Nickel	3.4E+04	8.0E+00	20	75–125	75–125
Potassium	—	1.0E+03	20	75–125	75–125
Selenium	8.5E+03	1.0E+00	20	75–125	75–125

Table 3-1 Project Quality Control Criteria

Analyte	Project Decision Threshold <sup>a</sup>	Detection Limit	Precision (RPD)	Accuracy (%R)	
				MS/MSD/ Surrogate	(LCS)
Silver	8.5E+03	2.0E+00	20	75–125	75–125
Sodium	—	1.0E+03	20	75–125	75–125
Thallium	—	2.0E+00	20	75–125	75–125
Vanadium	1.2E+04	1.0E+01	20	75–125	75–125
Zinc	—	4.0E+00	20	75–125	75–125
Explosives SW-846 8330 (USEPA 1996) (MG/KG)					
Octahydro-1,3,5,7-tetranitro-13,5,7-tetrazocine	3.4E+04	—	—	—	—
Hexahydro-1,3,5-trinitro-1,3,5-triazine	1.7E+01	—	—	—	—
1,3,5-Trinitrobenzene	3.4E+01	2.5E-01	—	—	—
Methyl-2,4,6-trinitrophenylnitramine	6.8E+03	—	—	—	—
Nitrobenzene	9.4E+01	—	—	—	—
2,4,6-trinitrotoluene	6.4E+01	2.5E-01	—	—	—
4-Amino-2,6-dinitrotoluene	2.8E+00	—	—	—	—
2-Amino-4,6-dinitrotoluene	2.8E+00	—	—	—	—
2,4-Dinitrotoluene	1.4E+03	—	—	—	—
2,6-Dinitrotoluene	6.8E+02	—	—	—	—
2-Nitrotoluene	6.8E+03	—	—	—	—
3-Nitrotoluene	6.8E+03	—	—	—	—
4-Nitrotoluene	6.8E+03	—	—	—	—
TPH					
TPH by Method 8015B	5.0E+02	5.0E+02	30	60–140	75–125

<sup>a</sup> USEPA Region IX Preliminary Remediation Goals for residential soil or tap water (USEPA 1996) unless otherwise noted.

• Method does not specify matrix spike/surrogate compounds or recovery criteria. Laboratory will use in-house procedures and limits.

— standard not established.

**Bold** Denotes analytes with detection limits higher than threshold concentrations.

## **4. QUALITY CONTROL AND CORRECTIVE ACTION**

Project data quality will be assured through internal (field and laboratory) and external (second-party review and validation) processes designed to meet the Data Quality Objectives.

### **4.1 FIELD QUALITY CONTROL**

Field data quality assurance and quality control will be accomplished through adherence to established, documented SOPs for each data collection activity. Field data collection will be audited in accordance with the IRP Procedures Manual. Further discussion of the audit process appears in Section 7, Audits and Corrective Actions.

Field QC samples will be collected in accordance with Sections 2.1 and 2.2. Use of the data is discussed in the following sections.

#### **4.1.1 Field Duplicates or Replicates**

Field duplicates or replicates will be evaluated qualitatively to assess the reproducibility of the sample collection procedures. The results of the analyses will be compared to laboratory criteria to assess whether the results demonstrate that the error inherent in the sampling procedures is within the expected analytical error.

If field duplicate data exceeds the laboratory data criteria, sample collection procedures, laboratory subsampling procedures, analysis results, and other sample results will be evaluated. The findings of the additional review will be incorporated into the Project Data Quality Assessment section of the RI Report, with discussion of the effect of the discrepancy on the ability to make decisions based on the data.

#### **4.1.2 Field Blanks and Equipment Rinsates**

Field blanks and equipment rinsates will measure the potential contamination resulting from the water used for the final rinse in the decontamination process and the decontamination of reusable equipment. Analytes detected in field blanks will be compared to analytes in equipment rinsates, trip blanks (where appropriate) and analytes found in samples. The effect of the presence of the analytes in the field blanks will be discussed in the Data Quality Assessment section of the RI Report.

#### **4.1.3 Trip Blanks**

Analytes detected in trip blanks will be compared to the sample results, laboratory blanks, and internal laboratory data quality evaluations. Trip blanks may be used to qualify results of sample analyses. Discussion of the presence of those analytes will be presented in the Data Quality Assessment section of the RI Report.

### **4.2 LABORATORY QUALITY CONTROL**

The laboratory is required to have an approved Quality Assurance Program with current SOPs for each method performed. The laboratory quality assurance program meets the requirements of the following guidance and documents:

- *Navy Installation Restoration Laboratory Quality Assurance Guide* (NFESC 1996)

- Earth Tech MSA for Analytical Laboratory Services (Earth Tech 1997b)

#### **4.2.1 Method Blanks**

A method blank will be analyzed with every batch of 20 or fewer samples to measure laboratory contamination. The method blank will be an analyte-free matrix (water or soil) that will be carried through the entire preparation and analysis procedure. If any analytes are found above detection limits, the results of samples in the batch will be examined. Those with results less than the detection limit or greater than ten times the blank value will be accepted. Other samples will be reanalyzed in another batch. Consistent presence of contamination will require investigation and corrective action.

#### **4.2.2 Laboratory Control Standards**

A laboratory control standard sample (LCS) will be analyzed with every batch of 20 samples or less to measure accuracy. The LCS will consist of a method blank spiked with a known amount of analyte. It will be carried through the entire preparation and analysis procedure. The LCS source will differ from the source used to prepare calibration standards. Analytes used for the LCS will comply with the method requirements. Control charts may be used and control limits will be calculated based on historical data. When control limits are exceeded, the analysis will be stopped and the problem corrected. Samples associated with the out-of-control LCS will be reanalyzed in another batch, unless documented evidence is presented to show that associated samples were not affected. Guidance limits for the LCS listed in Table 3-1 will be used unless laboratory developed limits are established.

#### **4.2.3 Matrix Spikes**

At least 1 out of every 20 matrix spike samples will be analyzed to measure effects of matrix on accuracy. Matrix spikes will consist of additional aliquots of sample spiked with a known amount of analyte. Compounds to be spiked will be in accordance with the laboratory SOP or the published method. Either the laboratory will establish acceptance limits or use the values listed in Table 3-1. If the analyte concentration in the sample is more than twice the amount of spike added, the spike will be considered invalid, and the recovery will not be calculated. If a valid spike recovery is outside acceptance limits and the LCS is in control, then matrix interference is indicated.

Surrogate spikes will be added to all samples analyzed for organic compounds to measure sample-specific accuracy. Surrogate compounds are listed in the referenced methods for SVOCs and Pesticide/PCBs. At least two of the VOC surrogates listed in Table 3-1 will be selected by the laboratory and used for spiking. Guidance limits for surrogates listed in Table 3-1 will be used unless laboratory-specific limits are established.

#### **4.2.4 Duplicates**

A duplicate or a matrix spike duplicate (MSD) will be analyzed on 1 out of every 20 samples for inorganics and organics, respectively, to measure precision. For any batch of samples that does not contain a duplicate or MSD (i.e., when insufficient sample is available), two LCSs will be separately prepared and analyzed. If the relative percent difference (RPD) does not meet the established acceptance limits, the problem will be investigated and corrected. Any affected samples will be reanalyzed in a separate batch. Acceptance limits for duplicates/MSDs listed in Table 3-1 will be used unless laboratory-specific limits are established.

### 4.3 COMPOUND IDENTIFICATION

Second-column confirmation will be performed on samples with positive results from gas chromatography or HPLC (high pressure liquid chromatography) analysis. Analytes are confirmed when detected on both columns within the established retention time windows. TPH detected in a sample with positive BTEX (benzene, toluene, ethylbenzene, and xylene) results is considered sufficient confirmation. Only confirmed results will be reported. Analytes detected by gas chromatograph/ mass spectrometer do not require second-column confirmation.

### 4.4 DATA CALCULATION AND REPORTING LIMITS

Calculation of results is documented in the laboratory SOPs and is required to be consistent with the referenced, published method. Reporting units will be consistent with and comparable to applicable regulatory and decision thresholds.

### 4.5 DOCUMENTATION AND DELIVERABLES

The laboratory will provide PACNAVFACENGCOM Level D data packages as described in Procedure IIA, *Data Validation Procedure 1, Presentation*. The packages will include a case summary. The laboratory will also provide data deliverables in a specified electronic format. All laboratory deliverables will be submitted within 35 days of receipt of samples at the laboratory.

## 5. DATA QUALITY ASSESSMENT

The scope and requirements of the project include a comprehensive evaluation of field and laboratory data quality. This will be conducted in general accordance with the following guidance:

- *IRP Procedures Manual* (DON 1996)
- *RCRA Corrective Action Program Data Review Guidance Manual* (USEPA 1997b)

The evaluation of the analytical data will include an assessment of precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters.

Reviewing particular types of QC sample results against pre-established acceptance limits assesses each of the PARCC parameters.

**Precision.** Overall precision will be measured through the analysis of field duplicates, collocates, and replicates. Laboratory analytical precision will be assessed through the analysis of laboratory duplicates and matrix spike/matrix spike duplicates. The precision goals for each compound are summarized in Table 3-1.

**Accuracy.** All field and analytical equipment and instrumentation will meet proper calibration and maintenance criteria. Accuracy will be monitored by the use of performance evaluation trip blanks, field blank, laboratory blank spikes, and lab matrix spikes. The accuracy goals for each compound are summarized in Table 3-1.

**Representativeness.** Representativeness will be assured through appropriate sampling procedures, selection of analytical methods, sample identification, and chain-of-custody. The representativeness will be evaluated qualitatively by second-party review of field and laboratory procedures and documentation. Care will be taken to collect samples, which represent the conditions to be measured.

Laboratory contaminants will be evaluated in accordance with data validation guidance (USEPA 1994a, b) and qualified accordingly. Analytes characterized as probable laboratory contamination will be removed from the data set and not evaluated further unless other evidence suggests that these analytes should be considered contaminants of concern.

**Comparability.** Comparability of data will be controlled by consistent application of the procedures outlined in this document and the FSP. Analytical methods, reporting detection limits, and units for each analyte will be consistent for both sampling events. If possible, the same laboratory will be used for both sampling events. To some extent, comparability will depend on variability of the physical and chemical characteristics of samples taken at different locations within the site. However, these sample matrix effects may be evaluated using MS and surrogate results. Individual results will be compared to historical data, and inconsistent results will be discussed in the report.

**Completeness.** Completeness will be assessed in terms of the percent of valid analytical results that are produced and will be based on the data validator's findings. The completeness objective for the project program is 100 percent. It should be noted that a "valid result" does not necessarily imply that 100 percent of the QC results were within an acceptable range. A result can be reported with qualifiers and still be considered valid. Rejected data (flagged with an "R" by data validators) are unusable, and the objective for this project is to have zero unusable results. Laboratory QC can fail

due to matrix effects and statistical outliers, but these do not normally lead to rejected data. Holding times, field QC samples, and laboratory QC checks will all be taken into account when assessing completeness. If the completeness goal is not achieved, the effect on the recommendations and conclusions will be discussed.

## 5.1 DATA VALIDATION

Independent review (validation) of laboratory deliverables will be performed to assess method compliance, calibration frequency and acceptability, QC frequency and acceptability, and data usability when failures are identified.

Due to the limited size of the sampling events for this project, PACNAVFACENGCOM Level D or "full" validation will be performed on all samples. Validation will be performed by an independent third-party subcontractor and will be in accordance with the IRP Procedures Manual and USEPA guidance documents (USEPA 1994a, b). Qualifiers indicating usability of data will be attached to each result.

Data may be assigned the following qualifiers:

- J estimated concentration;
- N presumptive evidence of the identification of an analyte;
- R rejected data (unusable); and
- U not detected (e.g., not present because of blank contamination, etc.).

Combinations of qualifiers such as UJ and NJ are also possible.

Data validation will be summarized in the Data Evaluation section of the report, and the effect of the validation qualifiers on the conclusions of the report will be presented.



## 6. DATA MANAGEMENT

The laboratory will verify, reduce, and report data as specified in their laboratory quality assurance plan and in accordance with the MSA (Earth Tech 1997b) and the CTO 0030 laboratory statement of work. Both hard copy and electronic data deliverables will be required within 35 days of sample receipt. The format for both hard copies and electronic data deliverables (EDDs) is specified in the MSA (Earth Tech 1997b). Hard copy data will be delivered on CLP-like forms, along with a case narrative, table of contents, and raw data for Level D QC deliverables. Investigators will manage, reduce, and report data as described below.

### 6.1 RECEIPT OF DELIVERABLES

Hard copy laboratory reports will be received and reviewed for completeness and compliance with the MSA (Earth Tech 1997b) and the laboratory statement of work. The project chemist will immediately review the case narrative and report to project management any issues that may effect the project conclusions or schedule. The project chemist will also ensure that appropriate copies are provided to technical staff, data validation, and project management.

EDDs will be received on 3.5-inch diskettes or through electronic mail in the format specified in the analytical laboratory technical specifications. EDDs will be loaded into a database management system and checked for completeness and errors. Part of this check involves verifying that all requested analyses for each sample were performed and reported. This may be accomplished by comparing the delivered results to those recorded electronically. If errors are encountered or data are not complete, the laboratory will be notified, and data must be resubmitted. If only minor errors or omissions are encountered, data management personnel will manually correct the data, but the laboratory will be notified so that it is aware of problems for future projects. Once in the database, the records will be made accessible to project personnel.

The electronic data versus hard copy data will be manually verified for the entire project. Final data tables will be compared to the database to verify the output.

Computer files will be backed up daily to avoid losing information. Hard copy data will be stored in secure areas, while electronic data will be stored in password-protected files with read-only access to users who do not have authorization to edit the data. The data will be stored for a period of 10 years after the close of the CLEAN II Contract.

### 6.2 DATA REDUCTION

Data reduction will consist of developing presentations of results and conclusions. Additional evaluation may be required, depending on the findings of the sampling events.

Data validation reports will be summarized. This summary will focus on changes to the data, especially rejected data, violations of protocol, recurring problems, changes in values, and data qualified as not detected because of blank contamination. A summary of reasons for changes will be included.

### 6.3 REPORTING

Laboratory sample data and QA/QC data will be included in both the hard copy and EDD packages. The turnaround time for this project is 35 calendar days as discussed above.

Complete data tables will be included in the RI Report for this project, typically as an appendix.

Reduced data will be presented in the main portion of each report. Reduced data may include summary data tables, figures showing significant contaminant concentrations or detections only, and text to supplement the tables and figures. The text generally will not present information included in summary data tables or figures, except to emphasize important results, patterns, or trends. Report text will focus on temporal trends, spatial patterns, and relation of analytes to waste sources.

Beyond data validation, a summary of the data relative to the DQOs will be provided. A photocopy of field logs may be included as an appendix in the RI Report. Finally, a summary of the results of laboratory and field system and performance audits described in Section 7 will be included in the final project files and summarized in the project reports.

## **7. AUDITS AND CORRECTIVE ACTIONS**

System and performance audits are a fundamental element of the quality assurance process and are the tool use to demonstrate compliance with data quality requirements.

Overall responsibility for implementing and monitoring the Earth Tech Quality Assurance Program resides with the CLEAN technical director. The CLEAN technical director and the project manager will be responsible for reviewing the technical contents of all submittals required under this project. QA activities applicable to this CTO are described in *DON Project Procedures Manual, U.S. Navy PACDIV IRP* (DON 1996), and *Earth Tech Standard Operating Procedures* (Earth Tech 1996). The Earth Tech Peer Review Program, as outlined in the *Standard Operating Procedures* (Earth Tech 1996), will be followed during this project.

### **7.1 LABORATORY SYSTEM AUDITS**

With issuance of the MSA, the laboratory was audited for capabilities and experience to meet most project CLEAN II requirements. The name of the laboratory will also be submitted for review by the U.S. Navy NFESC Laboratory Evaluation Program prior to the start of the project.

### **7.2 LABORATORY PERFORMANCE REVIEW**

Continuous laboratory performance review will be performed for the project. This will consist of the following tasks:

- Internal laboratory oversight by laboratory QA manager
- Frequent progress reports and discussions between the project chemist and the laboratory project manager
- Project chemist oversight of deliverables and reports
- Desktop evaluation of reports and data packages
- Data validation

### **7.3 CORRECTIVE ACTIONS**

Corrective action requests will be issued and tracked by the project laboratory coordinator when deficiencies or noncompliance are noted. These findings will be resolved in a timely manner, typically less than 30 days. Findings that affect the collection or interpretation of project data will be noted in the report.

### **7.4 REPORTS TO MANAGEMENT**

The program technical director may request that a specific quality assurance report be prepared, based on results of audits and potential corrective actions. If required, the quality assurance report will contain discussion of the current status of the project, including the results of performance and system audits, results of data quality assessments, quality assurance problems, and methods to resolve these problems.

## 8. REFERENCES

- Department of the Navy (DON). 1996. *Project Procedures Manual, U.S. Navy PACNAVFACENG-COM Installation Restoration Program*. PACNAVFACENGCOM. September.
- . 1997. Statement of Work, Site Investigation New Apra Heights Disposal Area Guam. November 18. PACNAVFACENGCOM.
- Earth Tech, Inc. (Earth Tech). 1996. *Standard Operating Procedures*.
- . 1997a. *Geophysical Investigation: New Apra Heights Disposal Area, Naval Activities, Guam*. November.
- . 1997b. Master Service Agreements for Analytical Laboratory Services.
- . 1998. *Draft Work Plan, Abbreviated Remedial Investigation, New Apra Heights Disposal Area, COMNAVMARIANAS, Guam*. April.
- Naval Facilities Engineering Service Center (NFESC). 1996. *Navy Installation Restoration Quality Assurance Guide*. February.
- U.S. Environmental Protection Agency. 1994a. *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analysis*. Hazardous Site Evaluation Division.
- . 1994b. *Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analysis*. Hazardous Site Evaluation Division.
- . 1995a. *Contract Laboratory Program, Statement of Work for Organics Analysis*. OLM03.1
- . 1995b. *Contract Laboratory Program, Statement of Work for Inorganic Analysis*. ILM04.0
- . 1996. *Region IX Preliminary Remediation Goals (PRGs)*. August.
- . 1997a. *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*.
- . 1997b. *Region IX Resource Conservation and Recovery Act Corrective Action Program Data Review Guidance Manual*.